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The Southern African Wasp Genus *Handlirschia* Kohl, 1897 (Hymenoptera: Apoidea, Sphecidae, Bembicinae)

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Abstract.—The poorly known digger wasp genus *Handlirschia* is revised for the first time, and two species are recognized, *aethiops* (Handlirsch, 1889) and *scoliaeformis* (Arnold, 1929); the latter is newly transferred from *Stizus*. *Handlirschia tricolor* Gess, 1973, is synonymized with *scoliaeformis* and a lectotype is designated for *Stizus scoliaeformis*. The revision includes diagnoses, descriptions, illustrations of significant characters for each species, and a distribution map. The phylogenetic position of *Handlirschia* within the Bembicinae is discussed.

Handlirschia Kohl, 1897 is a poorly known genus of digger wasp from southern Africa that was described for the single species, *Stizus aethiops* Handlirsch, 1889. The latter was based on a single male from eastern South Africa that remains the only specimen known. Gess (1973), without having seen the holotype of *aethiops*, described a second species, *Handlirschia tricolor*, based on five specimens, also from eastern South Africa.

As the first step toward a comprehensive revision of *Stizus*, I have compiled the original descriptions of species assigned to that genus. Based on the published description and figures, *Stizus scoliaeformis* Arnold, 1929, seemed to be unusual in lacking diagnostic characters of Stizini and Bembicini, such as an elongate submarginal cell I (Bohart and Menke 1976, Ohl 1999). Examination of the type series showed that *Stizus scoliaeformis* actually belongs in the genus *Handlirschia* within Gorytini (sensu Bohart and Menke 1976), and that *Stizus scoliaeformis* and *Handlirschia tricolor* are synonyms. Since then, roughly 50 more specimens of *Handlirschia*, all *scoliaeformis* (= *tricolor*), came to my attention. These findings prompted me to revise the genus in order to evaluate its species composition, provide diagnostic characters of the included species, and evaluate its phylogenetic relationships.

Diagnosis sections are not provided here since only two species are involved, and their defining characters are presented in the key.

TECHNICAL TERMS

Most morphological terms follow Bohart and Menke (1976). However, a few are explained here for convenience. I follow Melo (1999) in adopting the terminology of Smith (1970) for male genitalia.

Gonapophysis: penis valve of Bohart and Menke (1976).

Gonocoxite: gonostyle of Bohart and Menke (1976).

Metapostnotum: usually referred to as 'propodeal triangle', 'triangular area' or 'propodeal enclosure' in Apoidea, but in fact the metathoracic postnotum that is fused to the true propodeum (Brothers 1976). In *Handlirschia* the metapostnotum is more or less triangular and extends slightly onto the posterior surface of the propodeum.

Placoids and tyloids: I follow Bohart and Menke (1976:23–24) in distinguishing two kinds of specialized regions on male antennae. **Placoids** are "platelike, flat, or curved areas . . . that are . . . depressed below level of surrounding integument", whereas a **tyloid** is

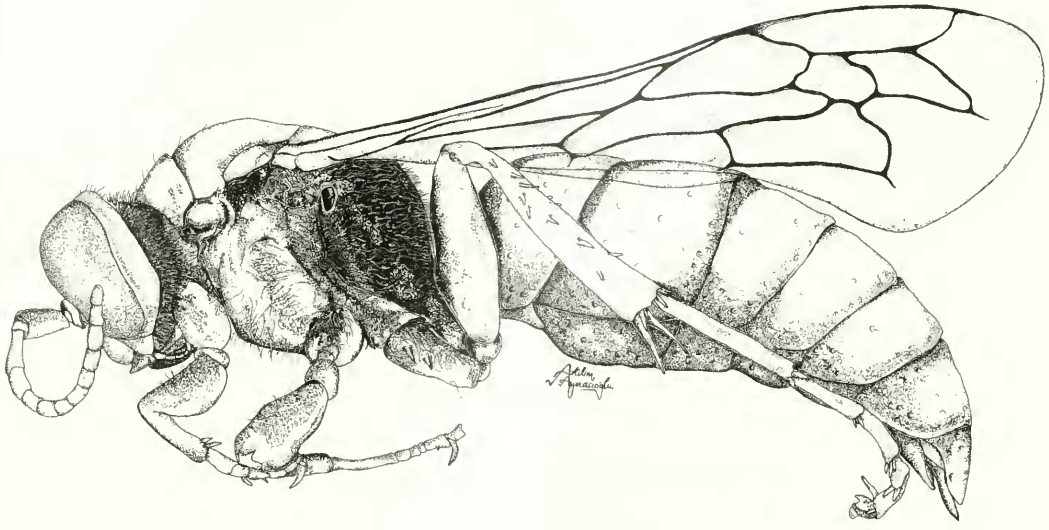


Fig. 1. *Handlirschia scoliaeformis*, male, habitus. Namibia, Okahandja.

defined as a "linear welt or cariniform swelling."

Torulus (plural: toruli): antennal socket of Bohart and Menke 1976, i.e., the socket on the frons of the face upon which the scape of the antenna is articulated (Fig. 2a).

All illustrations (except for Fig. 1, which is a traditional ink drawing) were prepared on a personal computer using Adobe® programs: a pencil drawing made with a camera lucida was digitized with a scanner as a bitmap-based illustration and then imported into the Adobe® Streamline 4.0 program. This software converts bitmap-based illustrations into vector-based illustrations, which were then modified in the Adobe® Illustrator 7.0 program to prepare the final illustrations.

Locality names are arranged in alphabetical order within each country, district, or province, respectively. Coordinates were taken from various sources, especially the catalogue of southern African place names by Leistner and Morris (1976) and the GEOnet names server of the NIMA Geographic Names Database (http://gnpswww.nima.mil/geonames/GNS/index.cfm). All coordinates follow the convertion used by the 'Times Atlas of the World' (i.e., 21.55S 16.08E instead of 21°55'S 16°08'E).

ORIGIN OF MATERIAL

Institutional or personal collections in which the material is deposited are abbreviated in the text as follows (names of contact person are in parentheses):

AMGS Albany Museum, Grahamstown, South Africa (Fred W. Gess).

BMNH British Museum (Natural History), London (Christine Taylor).

CAS California Academy of Sciences, San Francisco, USA (Wojciech J. Pulawski).

CSE Personal collection of Christian Schmid-Egger, Berlin, Germany.

MS Personal collection of Maximilian Schwarz, Ansfelden, Austria.

NHMW Naturhistorisches Museum, Wien, Austria (Stefan Schödl).

OHL Personal collection of Michael Ohl, Berlin, Germany.

SAM South African Museum, Cape Town, South Africa (Margie A. Cochrane).

USNM Smithsonian Institution, National Museum of Natural History,

Washington, D.C., USA (Maureen J. Mello).

Genus *Handlirschia* Kohl, 1897

Handlirschia Kohl, 1897:425. Type species: *Sphecius aethiops* Handlirsch, 1889, by monotypy.

Diagnosis.—*Handlirschia* is a member of Gorytini (Bohart and Menke 1976), an assemblage of 39 genera (Bohart 2000) that apparently lacks any apomorphy (see phylogenetic discussion below). The most important diagnostic features, which taxonomically place *Handlirschia* in Gorytini are the combination of two midtibial spurs (Fig. 2e), a keel-like basomedian ridge on sternum I, and submarginal cell I not unusually elongate (Fig. 2b). Within Gorytini, *Handlirschia* belongs to the branch of genera with an oblique scutal carina (Fig. 2c). Among these, it can be recognized by the lack of both a sternaulus and an omaulus, and by the presence of spiracular lobes in the male. Additionally, the inner eye margins are almost parallel (Fig. 2a), whereas the margins converge ventrally in some other gorytin genera.

Description.—A redescription of *Handlirschia* is provided because Bohart and Menke (1976) based their generic diagnosis and description on the single known specimen of *aethiops*. They treated as distinctive for *Handlirschia* some characters of male *aethiops* that do not occur in *scoliaeformis* (e.g., the prominent male sternal fimbriae and somewhat distorted apical flagellomeres). Included are those characters that vary within other Gorytini but are constant within *Handlirschia*. Reference is made to Stizini and Bembicini, which also have spiracular lobes in the male.

Head shape simple (Fig. 2a): eye inner margins almost parallel; frons with angular, transverse swelling below ocelli, shallowly depressed above antennae; toruli well above frontoclypeal margin; subantennal sutures well developed, reaching frontoclypeal suture between anterior tentorial pits; clypeus slightly, evenly convex, maximum width 2.5–2.8x median length; mandibles slightly curved subapically, with an inner preapical tooth; male antennae with tyloids and/or placoids. Pronotal collar (Fig. 2d) sloping gently, separated from scutum by transverse groove, topped by a sharp edge (less so in *scoliaeformis*); scutum with well-defined oblique scutal carina (Fig. 2c); omaulus, sternaulus, episternal sulcus and acetabular carina absent. Hindleg arolium smaller than other arolia (Fig. 2f,g); midtibia with two prominent spurs (Fig. 2e). Wings (Fig. 2b) infumate; pterostigma ill-defined, parallel-sided, posterior margin straight; both recurrent veins received by submarginal cell II; jugal lobe larger than tegula; hindwing media diverging before cu-a. Propodeum without spiracular groove; propodeal hindcorners projecting, hindface concave. Metapostnotum an equilateral triangle; median propodeal pit forming longitudinal groove that extends from posterior third of metapostnotum slightly onto propodeal hindface and that is delimited by distinctive carinae; the latter project onto the propodeal hindface almost down to the propodeal orifice. Tergum VII with large spiracular lobe (Fig. 5c). Sternum I with median carina distally (in addition to much larger basomedian carina) and many oblique to longitudinal rugulae; sternum II with basal hump (Fig. 1) and prominent, deep, transverse groove anterior to it; sternum VII largely reduced to a membranous sclerite between spiracular lobes (Fig. 5c).

Unfortunately, the genitalia and metasomal segment VIII of the holotype of *aethiops* were lost after Handlirsch (1889:469) studied them. He described them as follows: "The genitalia are almost the same as in the preceding species [which is a *Sphecius* in the sense of Bohart and Menke 1976], except for the sagitta lacking the outer point" (my translation). Segments VII-VIII and the genitalia were dissected and originally glued onto card bottom, which is pinned under the specimen. Only

segment VII (and most of the right antenna) is still present. Only two generic characters can be extracted from Handlirsch's description and *scoliaeformis*. Obviously sternum VIII is indeed narrowed to a sharp spine (Figs. 1, 5d, e). Apparently, the "outer point of the sagitta" [= volsella] is the cuspis, which also lacks in *scoliaeformis* (Fig. 5a, b). Absence of a cuspis is thus a generic character of *Handlirschia*. The alleged similarity to *Sphecius* is not informative, because there are remarkable differences in the male genitalia between *Handlirschia scoliaeformis* and the species of *Sphecius* that I have studied (*antennatus, grandis, hogardii, pectoralis, speciosus,* and *spectabilis*).

Phylogenetic Position.—A few pre-cladistic hypotheses on the relationships of *Handlirschia* have been published. Handlirsch (1889:467) placed *aethiops* in *Sphecius*, pointing out that "within that genus, *aethiops* represented a group of its own" (my translation). Kohl (1897) established a monotypic genus, *Handlirschia* for *aethiops*, which he supposed to be "intermediate between *Sphecius* and *Stizus*". He gave a list of characters to differentiate *Handlirschia* from the latter two genera and concluded that "apparently, *Handlirschia* is closer to *Stizus* than to *Sphecius*" (Kohl's *Stizus* included *Bembecinus*, to which he probably referred). Arnold (1929) placed *scoliaeformis* in *Stizus* and commented: "Quite unlike any other species of the genus and perhaps deserving to rank as the type of a subgenus" (Arnold 1929:318). Gess (1973) compared his new species, *tricolor*, only with *Sphecius*, thus implying placement in the Gorytini. Bohart and Menke (1976) emphasized the similarity of *Handlirschia* to *Sphecius* and *Kohlia* and considered *Handlirschia* as the most basal branch of those Gorytine that have an oblique scutal carina (Bohart and Menke 1976:509, Fig. 155). Furthermore, they "put it on a separate line of evolutionary development in the general direction of the Bembicini and Stizini . . . In fact *Handlirschia* would probably be put in Stizini except for the rather typical gorytin wing venation" (Bohart and Menke 1976:509).

A comprehensive cladistic evaluation of the phylogenetic position of *Handlirschia* is beyond the scope of the present paper. *Handlirschia* is a member of Gorytini (sensu Bohart and Menke 1976, Bohart 2000) within the clade Bembicinae (sensu Melo 1999). As Bohart and Menke (1976) indicated, the Gorytini are a group of genera united only by symplesiomorphic features. Therefore, the tribe is probably a paraphyletic assemblage (Fig. 3a). Alexander's (1992) phylogenetic analysis of the Apoidea did not evaluate the phylogenetic status of the Gorytini, because he used tribes as terminal taxa. Melo (1999) analyzed the relationships within Apoidea on the level of genera representing most of Bohart and Menke's tribes. Although he used only two representatives of the remarkably heterogeneous Gorytini (*Hoplisoides* and *Ochleroptera*), his results support the assumption of its paraphyly.

Nemkov and Lelej (1996) presented a cladistic analysis of Gorytini (Fig. 3b). They did not include any outgroup (e.g., Stizini, Bembicini) in their study, however, so that they could not test the phylogenetic status of Gorytini. They studied no specimens of *Handlirschia* and relied on characters listed by Bohart and Menke (1976), some of which are lacking in *scoliaeformis*. They established a new subtribe, Handlirschiina. This subtribe is not recognized here, because it is a redundant name for an already named clade, *Handlirschia*. Recognition of Handlirschiina would not be an improvement neither for taxonomic nor for phylogenetic purposes. Nemkov and Lelej placed *Handlirschia* as the basal branch of the assemblage of gorytine genera with an oblique scutal carina (Fig. 3b). This is not surprising because an oblique scutal carina is indeed a characteristic of most Gorytini (except for five genera). However, Nemkov and Lelej did not consider the potentially significant fact

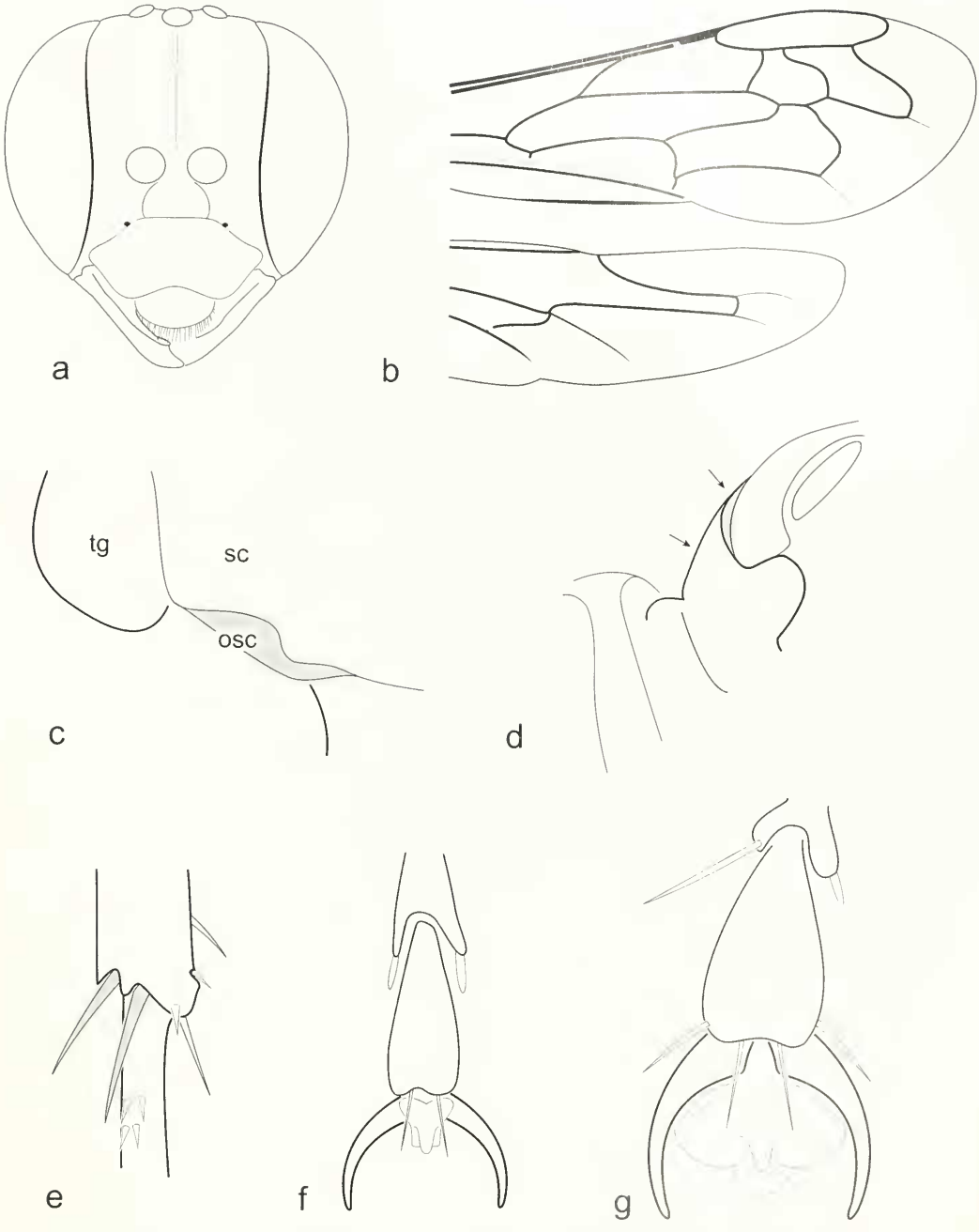
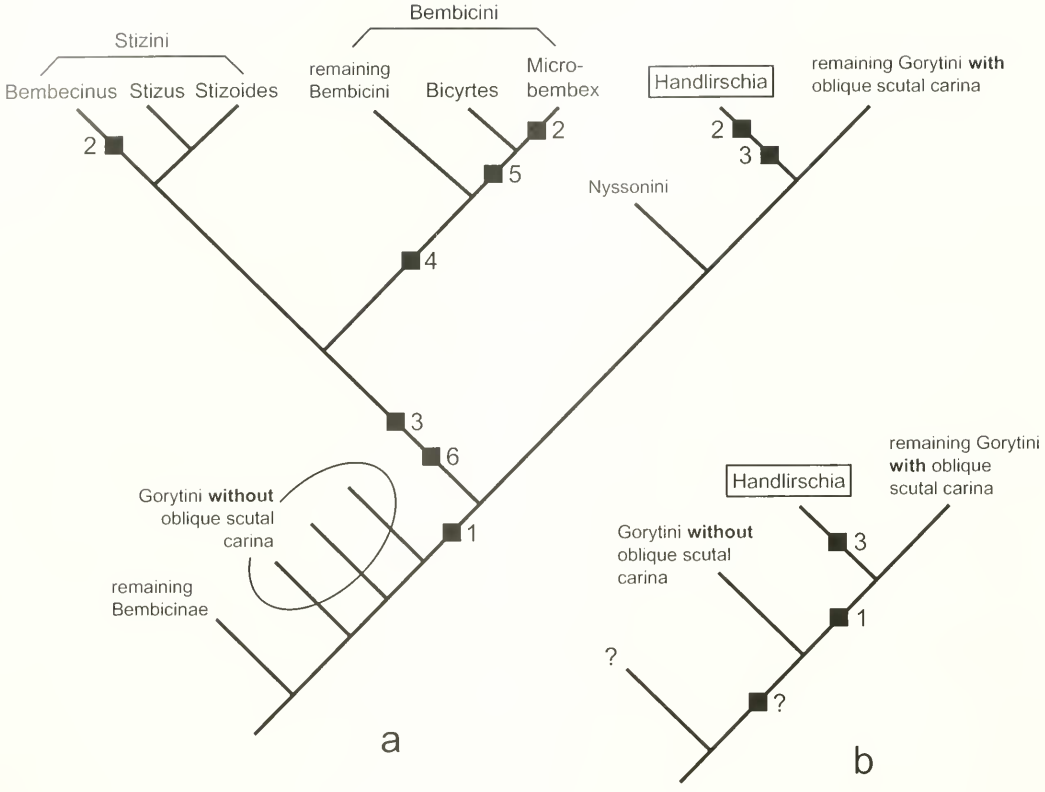
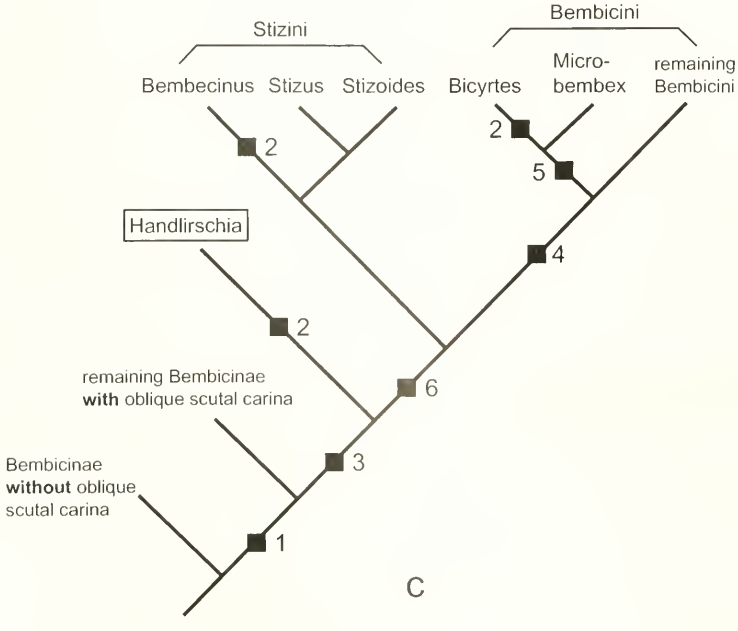


Fig. 2. *Handlirschia*. Some generic characters (drawn from Namibian specimens of *scoliaeformis*). a, Fore and hindwing. b, Head frontally. c, Oblique scutal carina (osc), left posterior edge of scutum (sc) (tg = tegula). d, Anterior part of thorax (arrows indicate gently sloping pronotum and sharp-edged posterior groove, respectively). e, Apex of left midtibia with two midtibial spurs. f, Hindtarsomeres IV-V. g, Foretarsomeres IV-V (female).


Bembicini
Stizini
Bembecinus Stizus Stizoides
remaining Bembicini
Bicyrtes
Micro-bembex
Handlirschia
remaining Gorytini with oblique scutal carina
Nyssonini
Gorytini without oblique scutal carina
remaining Bembicinae
a
Handlirschia
remaining Gorytini with oblique scutal carina
Gorytini without oblique scutal carina
b


Stizini
Bembicini
Bembecinus Stizus Stizoides
Bicyrtes
Micro-bembex
remaining Bembicini
Handlirschia
remaining Bembicinae with oblique scutal carina
Bembicinae without oblique scutal carina
c

that an oblique scutal carina is also present in Nyssonini, Stizini, and Bembicini within Bembicinae.

The only unique apomorphy of *Handlirschia* that Nemkov & Lelej (1996) identified is the presence of spiracular lobes of tergum VII (Figs. 4a, 5c). Besides *Handlirschia*, this character occurs only in Stizini and most Bembicini (lobes missing in *Bicyrtes* and *Microbembex*), which together form a monophyletic group based on the presence of an unusually elongate submarginal cell I. Since Nemkov and Lelej (1996) did not include Stizini and Bembicini in their analysis, not surprisingly they considered the presence of a spiracular lobe as an apomorphy of *Handlirschia*. A preliminary alternative interpretation is depicted in Fig. 3c and explained below.

The other three characters mentioned by Nemkov & Lelej (1996) as homoplastic apomorphies for *Handlirschia* are of less or no phylogenetic significance: (a) labrum prominent (weakly contrasting with the alternative character state "labrum inconspicuous", and very likely modified secondarily); (b) omaulus absent (omaulus missing in many other gorytine genera); (c) terga III, IV, and sometimes V with dense, apical fimbriae (present only in *Handlirschia aethiops*).

In summary, Kohl (1897) and more explicitly Bohart and Menke (1976) were the first to imply a close relationship of *Handlirschia* with Stizini and Bembicini, although they still placed the genus in Gorytini. As discussed above there is indeed a good reason to suppose that *Handlirschia* and Stizini + Bembicini together form a monophyletic group, at least based on the striking presence of spiracular lobes. Fig. 3c illustrates this preliminary hypothesis based on the assumption of a unique development of spiracular lobes, thus placing *Handlirschia* as the sister group of Stizini + Bembicini. This tree agrees with a unique evolution of the elongate submarginal cell I in Stizini + Bembicini and the unique loss of the spiracular lobes in *Bicyrtes* and *Microbembex*, but still implies a parallel evolution of the concave propodeal hindface in *Handlirschia*, *Bembecinus*, and *Bicyrtes*, respectively. Based on the six characters considered here, the hypothesis in Fig. 3c is more parsimonious than Bohart and Menke's hypothesis (Fig. 3a): there is no length difference for characters 1–2 and 4–6 on the two trees, but spiracular lobes (character 3) were evolved only once in Fig. 3c rather than twice in Fig. 3a. However, this conflicting character polarization can only be more definitively resolved in the frame of a cladistic analysis of the entire Bembicinae, taking into account much more characters and taxa.

Life History.—Unknown. The presence of a female foretarsal rake suggests ground nesting. Flower records are known only for *scoliaeformis* and are derived exclusively from the fieldwork of S.K. Gess and F.W. Gess, Grahamstown, South Africa. These data are given in the Life History section of *scoliaeformis*.

KEY TO SPECIES OF *HANDLIRSCHIA*
(The female of *aethiops* is unknown.)

1. Metapostnotum smooth, shiny, contrasting with coarsely, irregularly punctatorugose propodeal dorsum. Metapleuron and anterior part of propodeal side smooth, shiny. Black,

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Fig. 3. *Handlirschia*. Three hypotheses on the phylogenetic relationships within the Bembicinae. a, Combined and redrawn after Bohart and Menke (1976: Figs 155, 181). b, Redrawn after Nemkov and Lelej (1996: Fig. 2). c, Preliminary hypothesis of the present paper. For discussion see Phylogenetic Position section. Character numbers: 1 = oblique scutal carina present, 2 = concave hindface of propodeum, 3 = presence of spiracular lobes, 4 = ocelli deformed, 5 = spiracular lobes reduced, 6 = elongate submarginal cell I.

appendages and face partly yellow-orange (males only?). Metasoma covered by distinctive erect setae that are two midocellar diameters long, pale on terga I-II, black on III-IV. Males: sterna III-V with short, erect, apical fimbriae (Fig. 4f); flagellomeres IV-XI shallowly excavated ventrally, with broad placoids; femora and tibiae conspicuously modified (see Description for details). ..... ***aethiops* (Handlirsch)**

– Metapostnotum and propodeal dorsum coarsely punctatorugose to finely rugose (except for small impunctate area at apex of metapostnotum). Metapleuron and anterior part of propodeal side microsculptured, dull. Thoracic dorsum and at least basal terga largely yellow-orange. Metasoma with short, appressed, golden setae less than one diameter long. Males: Sterna without fimbriae; flagellomeres V-IX at most slightly convex ventrally, with narrow, linear tyloids; legs unmodified. ..... ***scoliaeformis* (Arnold)**

Handlirschia aethiops (Handlirsch, 1889) (Fig. 4)

Sphecius Aethiops Handlirsch, 1889:467, male, incorrect original capitalization. Holotype: male, South Africa: "Caffraria" [eastern South Africa, see note below]: no specific locality (NHMW), examined.—As *Handlirschia aethiops:* Kohl, 1897:425 (new combination); Arnold, 1929:259 (Handlirsch's description translated into English); Bohart and Menke, 1976:509 (listed); Dollfuss, 1989:9 (holotype in NHMW).

Description.—(Based on holotype, a male.) Length 13.8 mm. Black with the following yellow-orange: antennae, labrum, clypeus, frons below upper rim of toruli (somewhat extending above toruli at inner eye margin), and a narrow streak behind each eye. Flagellomeres II-XI somewhat distorted: II with oblique, inner ventral depression; III ventrolaterally with slightly convex, elongate, black spot, otherwise unmodified; IV with similar but much smaller spot and comma-shaped tyloid on ventral surface; V-VIII with depressed, shiny, ventral placoids; IX with a tiny, basoventral tyloid. Frons punctatorugose; vertex microsculptured, with scattered punctures, markedly punctured between ocelli and at posterior margin of vertex. Scutum shiny, with punctures about one diameter apart; punctures on scutellum and metanotum less than one diameter apart to subcontiguous. Mesopleuron coarsely and densely punctate, largely covered with long, dense, pale setae, almost obscuring sculpture. Metapleuron and metapostnotum impunctate, shiny. Propodeal side impunctate and shiny before spiracle, coarsely and sparsely punctate behind spiracle, many punctures more than one diameter apart. Propodeal hindface coarsely punctatorugose laterally, with irregular, longitudinal carinae medially. Forefemoral venter markedly convex, with many erect, pale setae; foretibia with conspicuous, toothlike projection anterobasally (Fig. 4e). Midfemur clublike (Fig. 4b), widest in apical half, depressed in basal half. Midtibia (Fig. 4b, c) deeply emarginate at spur insertion and pointed apically, with two prominent, apical spurs, inner surface with a prominent toothlike projection. Hindfemur parallel-sided, almost cylindrical (Fig. 4d). Setae pale on terga I-II, brown on terga III to VII. Tergal punctation coarse, sparsest on tergum I (many punctures 2–3 diameters apart), becoming denser from tergum II to VII. Setae pale on sterna I-III, brownish on IV-VII. Sternum II with rounded, basal hump. Sterna coarsely punctate to punctatorugose throughout. Sterna III-V with apical fimbriae (Fig. 4f), shortest on sternum III (The setae of the sternal fimbriae are fused into compact triangles of remarkably similar size (Fig. 4f). This is probably a preservation artifact, and it is most likely the fimbriae originally formed compact, homogeneous rows). Sternum VII (Fig. 4a) small, sclerotized median part triangular, membranous laterally. Spirac-

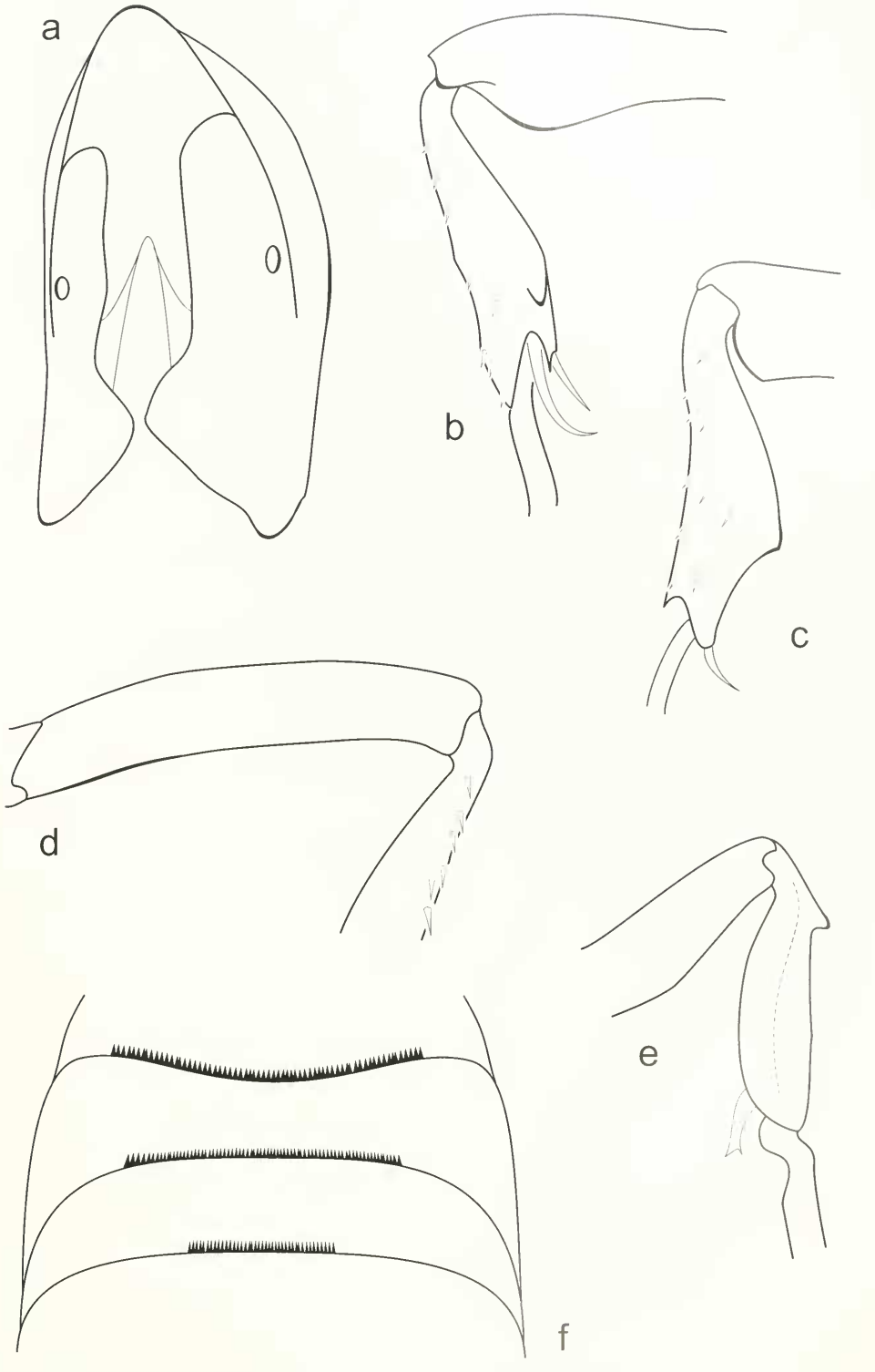

Fig. 4. *Handlirschia aethiops*. a, Segment VII in oblique ventral view. b-c. Right foreleg. b, Anterior view. c, Oblique lateral view. d, Right hindleg, posterior view. e, Right midleg, posterior view. f, Sterna III-V, posterior margins with apical fimbriae.

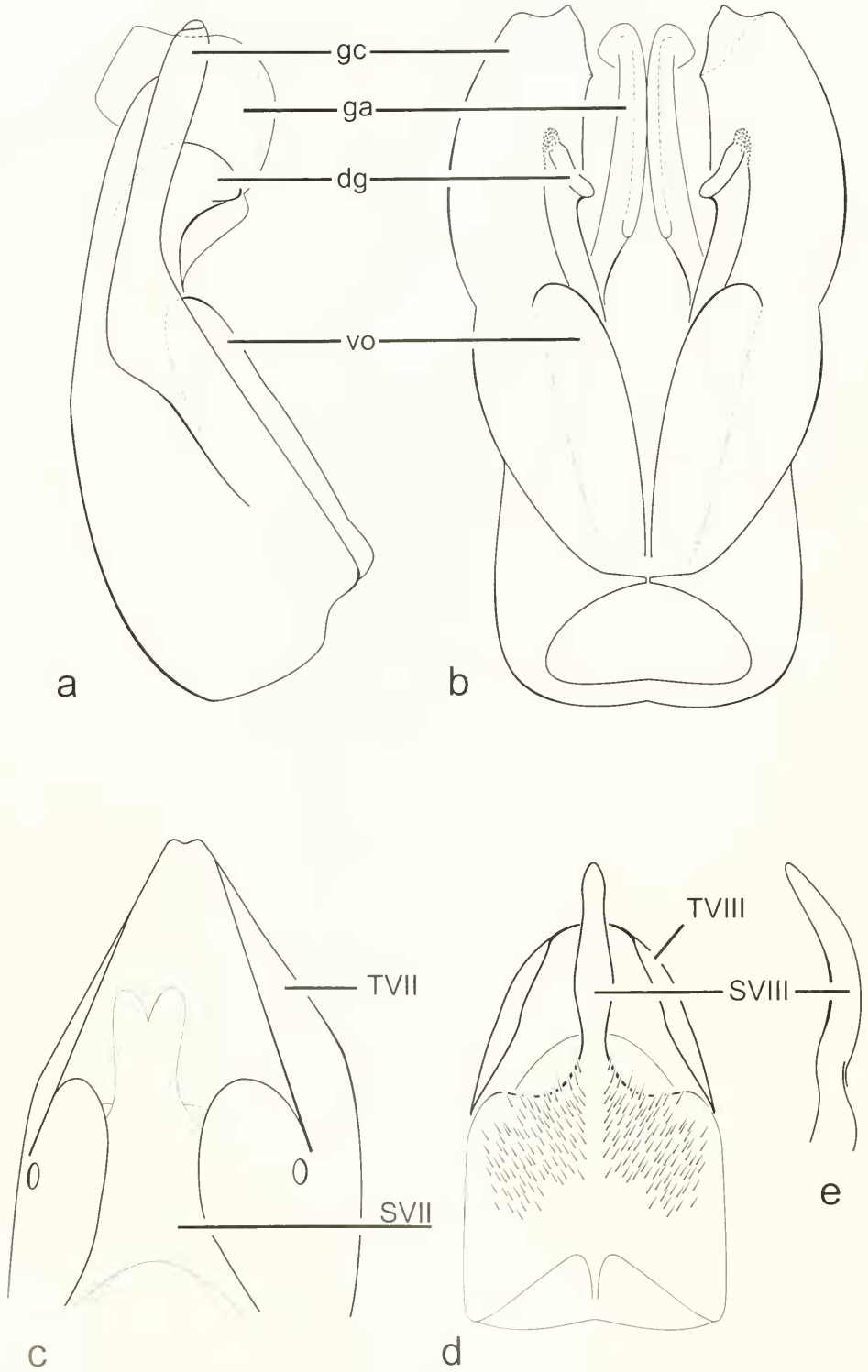

Fig. 5. *Handlirschia scoliaeformis*, male genitalia and metasomal segments VII-VIII. a, Genitalia, lateral view. b, Genitalia, ventral view (slightly compressed to spread gonapophysis). c, Segment VII, oblique ventral view.

ular lobes of tergum VII long (Fig. 4a), extending over more than half of total tergal length, approaching midline basally. Metasomal segment VIII and genitalia missing.

Type Locality and Collector.—Handlirsch (1889:469) gave the following information on the holotype of *aethiops*: "Süd-Afrika, Caffraria, Mus. Vindob. Coll. Winthem" (Mus. Vindob. = NHMW). Webster's Geographical Dictionary defines Caffraria (or Kaffraria) as "a region of Eastern Cape Province ... from Great Kei River on South to KwaZulu-Natal Province on North between the Drakensberg and the coast; largely equivalent to the main portion of former Transkei ...". In the early 19th century, however, Caffraria was sometimes used in a broader sense, probably covering most of eastern South Africa (F. Gess, pers. comm., Oct 2000). The holotype is undated, but "Coll. Winthem" probably refers to the collection of Wilhelm von Winthem (1799–1847), whose Hymenoptera and Diptera material was transferred to the NHMW in 1852 (Horn et al. 1990). Von Winthem apparently never traveled outside of Europe, but he communicated with "close to 200 scientific correspondents" (Steetz 1848), who identified, exchanged, and donated material, and he also purchased collections. Thus, the holotype of *aethiops* was obviously collected before 1847, but most likely not by von Winthem.

Variation and Life History.—Unknown.

Geographic Distribution.—Eastern South Africa is known.

Material Examined.—SOUTH AFRICA: "Caffraria" (= eastern South Africa): no specific locality (holotype male, NHMW).

Handlirschia scoliaeformis (Arnold, 1929), new combination
(Figs. 1–2, 5–7)

Stizus scoliaeformis Arnold, 1929:317, female, male. Lectotype: male, Namibia: Kaokoveld, Warmbad (SAM), **present designation** (here designated in order to ensure the name's proper and consistent application), examined.—Bohart and Menke, 1976:527 (listed).

Handlirschia tricolor Gess, 1973:103, female, male. Holotype: male, South Africa: Transvaal: Gravelotte, Beacon Ranch (AMGS), not examined. **New synonym.**—Bohart and Menke, 1976:509 (listed).

Description.—*Handlirschia scoliaeformis* was described in length by Gess (1973, as *tricolor*), whose paper should be consulted for more details. For coloration see Variation section below. Frons microsculptured, impunctate, dull. Pronotal collar microsculptured, with a few scattered macropunctures. Mesopleuron coarsely, densely punctate medially. Metapleuron and propodeal side before propodeal spiracle impunctate, dull; posterior half of propodeal side with coarse, scattered punctures that are denser posteriorly. Metapostnotum and hindcorners and dorsum of propodeum coarsely punctatorugose. Hindface of propodeum with two longitudinal carinae. Midtibial spurs prominent, straight (Fig. 2e). Anterior hump of sternum II impunctate, microsculptured along midline. Sterna densely punctate, except sternum II obliquely punctatorugose laterally.

Female.—Length 8.8–15.8 mm. Foreleg with foretarsal rake. Scutum, scutellum, and metanotum indistinctly punctatorugose. Foreleg arolium and tarsomere V markedly enlarged (Fig. 2g). Tergum I

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d, Segment VIII in ventral view. e, Apical spine of sternum VIII, lateral view. Abbreviations: dg = digitus; ga = gonapophysis; gc = gonocoxite; vo = volsella; SVII/SVIII = sternum VII and VIII; TVII/TVIII = tergum VII and VIII.

densely punctate throughout, punctures denser and shallower on following terga.

Male.—Length 10.0–16.9 mm. Flagellomeres III-VII with linear tyloids, VIII with a circular tyloid, IX in most specimens without modifications, in some specimens with tiny, polished, basal spot. Scutum indistinctly punctatorugose, single punctures discernible toward posterior margin. Hindfemoral dorsum convex. Punctation of tergum I coarse, many punctures about one diameter apart, less than that on tergum II, shallower and denser on terga III to VI, tergum VII coarsely punctate. Spiracular lobes of tergum VII short, rounded, not extending beyond basal third of tergal length (Fig. 5c). Sternum VII membranous, bilobed apically (Fig. 5c). Sternum VIII with a slightly curved, sharp spine (Fig. 5d, e). Gonocoxite with folded, membranous tip (Fig. 5a, b). Gonapophysis compressed laterally (Fig. 5b), rounded in lateral view (Fig. 5a). Lateral margin of volsella embedded in and hardly discernible from basoventral part of gonocoxites (Fig. 5b); cuspis missing; digitus markedly sclerotized, narrow, with minute teeth dorsally (Fig. 5b).

Variation.—*Handlirschia scoliaeformis* shows a remarkable geographic color variation: almost all specimens from Namibia are extensively marked with yellow or yellow-orange, with a strongly contrasting black propodeum (Fig. 6a). Moreover, all terga are almost completely yellow-orange, with only the tergal margins narrowly black and with the band of tergum I broken into two large spots. In some specimens one ore more of the basal terga have additional black markings, but the apical terga always have complete yellow bands (Fig. 6a). In contrast, specimens from eastern South Africa, including the types of *tricolor*, have the propodeum largely yellow-orange (Fig. 6b) or at least with some yellow-orange markings (Fig. 6c). Additionally, the basal terga have more yellow than the terminal ones, which are usually all black (at least terga V-VI in females and V-VII in males) (Fig. 6b, c). The same holds for coloration of the head, which has more black in eastern (Fig. 6c) than in western specimens (Fig. 6a). One female from Rundu (Namibia) is intermediate in having a predominantly yellow-orange propodeum, a partly black face, and largely black, terminal terga. In addition to color, specimens from western Namibia average larger (females 11.2–15.8 mm, males 12.8–16.9 mm long) than specimens from eastern South Africa (females 8.8–13.0 mm, males 10.0–14.1 mm long).

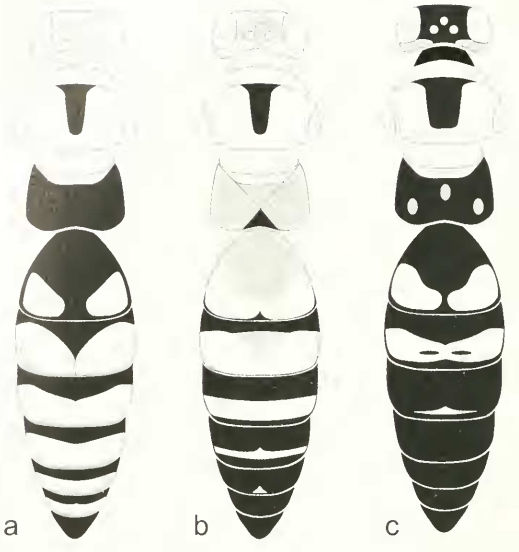

Fig. 6. *Handlirschia scoliaeformis*. Geographic color variation (based on males, but females exhibit the same tendency). Colors used: white = yellow-orange, black = black, grey = dark reddish-brown. a, Namibia, 30 km W Okahandja. b, South Africa, Gravelotte (paratype male of *H. tricolor*). c, South Africa, Ellisras.

Although I did not study the holotype of *tricolor* and some other material from Namibia, housed in the AMGS, Fred Gess (pers. comm.) confirmed that these specimens correspond exactly to the above observations.

Life History.—All information on the life history of *scoliaeformis* is derived from the fieldwork of Sarah K. Gess and Fred W. Gess (Grahamstown, South Africa), including identification of prey and flowers.

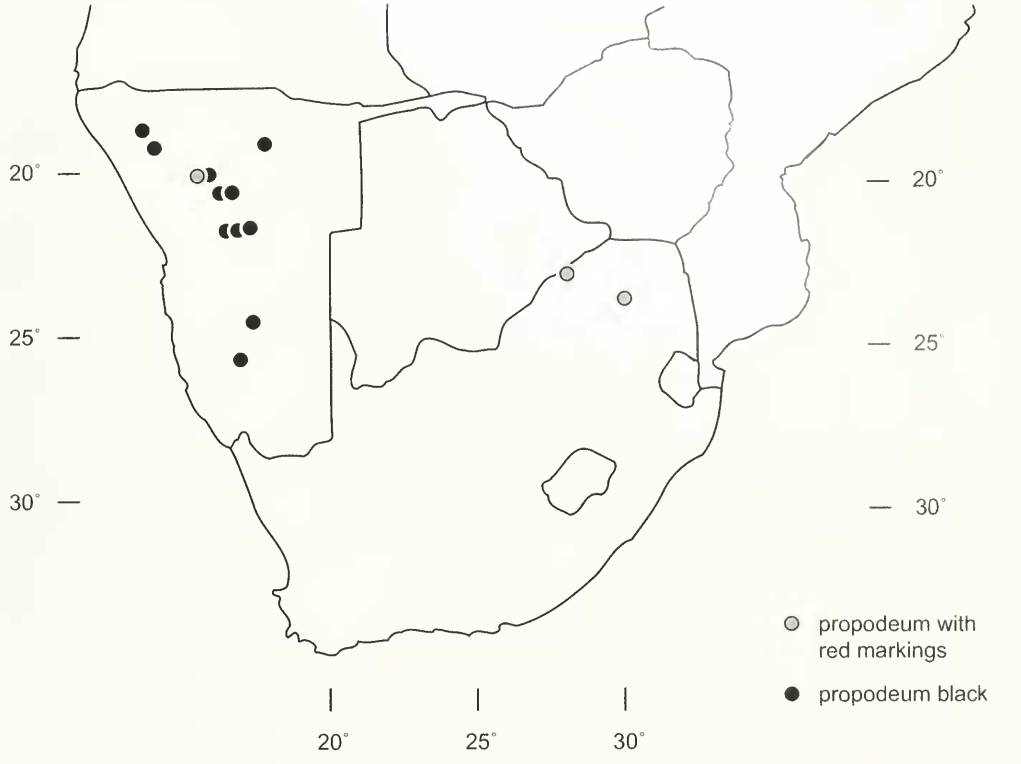

Fig. 7. *Handlirschia scoliaeformis*. Collecting localities.

One male from Namibia has been collected as prey of the asilid fly *Stiphrolamyra bipunctata* Loew. Floral records for *scoliaeformis* are: Amaranthaceae: *Hermbstaedtia odorata* (Burch.). Euphorbiaceae: *Chamaesyce glanduligera* (Pax) Koutnik. Molluginaceae: *Limeum argute-carinatum* Wawra and Peyr., and *L. myosotis* E. Walter.

Geographic Distribution (Fig. 7).—Namibia and Northern Province of South Africa.

Material Examined (FSG is used here as an abbreviation for F.W. and S.K. Gess).—NAMIBIA: **Karibib District**: 84 km W of Okahandja on road to Karibib (21.55S 16.08E), 2 Apr 1997 (visiting deep pink flowers of *Hermbstaedtia odorata* (Burch.) T.Cooke, Amaranthaceae), FSG (3 males, AMGS). **Kavango Gebied**: 100 km SW Rundu (17.56S 19.46E), 25 Jan 1993 (1 female, MS). **Khorixas District**: 44 km from Helmeringhausen on road to Spes Bona (25.48S 16.23E), 16 Mar 1997 (visiting white flowers of *Limeum myosotis* E. Walter, Molluginaceae), FSG (2 males, 1 female, AMGS), same data, but prey of male *Stiphrolamyra bipunctata* Loew (Diptera: Asilidae) (1 male, AMGS), same locality, 17 Mar 1997 (visiting white flowers of *Limeum myosotis* E. Walter, Molluginaceae) (1 male, AMGS), same data (visiting flowers of *Chamaesyce glanduligera* (Pax) Koutnik, Euphorbiaceae) (1 male, 1 female, AMGS). Kaross (19.30S 14.20E), "[South African] Mus. Exped.", Feb 1925 (paralectotype female, SAM). **Maltahöhe District**: Nomtsas (24.25S 16.51E), 18 Mar 1997 (visiting white flowers of *Limeum argute-carinatum* Wawra and Peyr., Molluginaceae), FSG (1 female, AMGS). **Okahandja District**: Leeu River, 9 km W Okahandja (21.58S 16.50E), 13 Feb 1996, W.J. Pulawski (1 female, CAS); 30 km W Okahandja (21.55.56S 16.31.61E), 1500m,

Malaise-trap, 2–5 Mar 1997, M.O. Niehuis (7 males, 11 females, OHL; 1 male, 1 female, CSE). **Opuwo District**: Warmbad (= Warmquelle, 19.10S 13.49E), Koakoveld (probably a misspelling of Kaokoveld), "[South African] Mus. Exped.", Feb 1925 (types of *scoliaeformis* (paralectotypes here designated): lectotype male, 2 paralectotype males, paralectotype female, SAM). **Otjiwarongo District**: 18 mi NE Kalkfeld (20.45S 16.16E), 22 Feb 1996, W.J. Pulawski (2 males, 6 females, CAS; 1 female, BMNH); 25 km NE Kalkfeld (20.41S 16.18E), 27 Feb 1996, W.J. Pulawski (2 females, CAS); 15–20 km NW Otjiwarongo, 3 Mar 1990, W.J. Pulawski (2 males, 4 females, CAS). **Outjo District**: 24 km S Kamanjab, 5 Mar 1990, W.J. Pulawski (1 female, CAS); 18 km by road C40 from road C38 (20.02S 15.55E), 29 Mar 1997 (flying low amongst grass), FSG (1 female, AMGS). **Tsumeb District**: 10 km SE Tsumeb (19.13S 17.42E), 8 Mar 1990, W.J. Pulawski (5 males, CAS; 1 male, MS). SOUTH AFRICA: **Northern Province**: Ellisras (23.40S 27.44E), 24 Dec 1973, H.N. Empey (1 male, AMGS). Gravelotte (23.57S 30.37E), Beacon Ranch, Jan 1966, D.J. Brothers (types of *tricolor*: holotype male, 2 paratype males, paratype female (referred to as "allotype" in Gess, 1973, and labeled accordingly), AMGS; paratype male, USNM).

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